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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/700,635 | 11/05/2003 | Kazunori Mune | Q78224 | 4858 |
| 23373 | 7590 | 04/14/2005 | EXAMINER | |
| SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037 | | | | PENG, CHARLIE YU |
| ART UNIT | | PAPER NUMBER | | |
| | | | | 2883 |

DATE MAILED: 04/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

✓ EF

| | | |
|------------------------------|------------------------|---------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/700,635 | MUNE ET AL. |
| | Examiner | Art Unit |
| | Charlie Peng | 2883 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on ____.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) Claim(s) ____ is/are allowed.
- 6) Claim(s) 1-8,11 and 12 is/are rejected.
- 7) Claim(s) 9 and 10 is/are objected to.
- 8) Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 06 November 2003 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. 10/700,635.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ . |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>20050407</u> . | 6) <input type="checkbox"/> Other: ____ . |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, 11, and 12 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 6,855,478 to DeVoe et al. in view of U.S. Patent 6,132,930 to Hayashi et al.

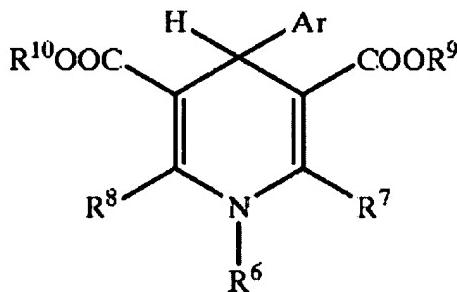
DeVoe teaches a method of microfabrication in which a laser is illuminated (irradiated) upon a photodefinable composition, and a focal point of the laser is moved in a three-dimensional manner within the photodefinable composition by means of X-Y-Z servo-feedback-controlled translation stages to create a pattern of inter-connected waveguides (cores) **26**. (See at least **Column 16 / Example 1**) The photodefinable composition is coated as a film onto a silicon wafer substrate prior to patterning by the laser. DeVoe further teaches the film can be further cured by heating while maintaining the waveguide structure and performance. DeVoe still further teaches that the laser can have a pulse width of less than 200 femtoseconds (or 200×10^{-15} seconds) and has an average power of up to 1400mw. It is noted that the word "imidize" has no specially meaning defined by the applicant in the Specification or to one having ordinary skill in the art. For the purpose of this prosecution, it is the Examiner's understanding, through

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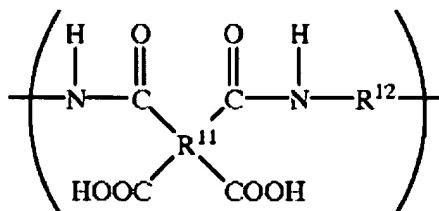
the interpretation of the Specification that "imidize" means to cure or to polymerize a polyamic material (for it to become a polyimide).

DeVoe does not teach the photodefinable composition film is polyamic acid obtained from tetracarboxylic dianhydride, a diamine, and a 1, 4-dihdropyridine derivative.

Hayashi teaches a negative photoresist composition comprising a polyamic acid and a 1, 4-dihdropyridine derivative represented by the general **formula (2)**:



wherein Ar represents an aromatic group having a nitro group in an orthogonal position, R⁶ represents an alkyl group having 1 to 5 (a range that includes 1-3) carbon atoms, and R⁷, R⁸, R⁹, and R¹⁰ each independently represents a hydrogen atom or an alkyl group having 1 to 4 (a range that includes 1-2) carbon atoms. (See Column 2, lines 28-64) The polyamic acid represented by a general formula (5):



which can be obtained by reacting a carboxylic dianhydride having a tetravalent skeleton such as diphenylhexafluoropropene (R^{11}) with a diamine having bivalent skeleton such as diphenylhexafluoropropene (R^{12}). Hayashi further teaches that preferred among the 1,4-dihdropyridine derivatives represented by general **formula (2)** given above is 1-ethyl-3,5-dimethoxycarbonyl-4-(2-nitrophenyl)-1,4-dihdropyridine (**formula (4), column 3, lines 19-30**). Hayashi still further teaches that the 1,4-dihdropyridine derivative represented by general **formula (2)** is incorporated in such amounts that the sum thereof is generally from 5 to 50 parts by weight per 100 parts by weight of the polyamic acid. Hayashi still further teaches that the photoresist composition can be irradiated to conduct exposure to obtain a desired pattern, and then heated to a high temperature to imidize the polyamic acid.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the photoresist composition by Hayashi for the photodefinable composition by DeVoe in the method of microfabrication. The motivation would be to take advantage of the many excellent qualities of the photoresist composition by Hayashi such as sensitivity, resolution, adherability, etc.

Allowable Subject Matter

Claims 9 and 10 are objected to as being dependent upon a rejected base claim 6, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. DeVoe and Hayashi teach the process of producing the optical waveguide using a laser beam on a polyamic film except for the

particular repeating frequency of the pulse laser. There is no obvious motivation to one having ordinary skill in the art at the time the invention was made to combine other prior art to meet the claims. It is the examiner's opinion that the prior art of record, taken alone or in combination, fails to disclose or render obvious in combination with the rest of the limitations of the base claim.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,177,225 to Weber et al.,

U.S. Patents 5,851,736, 5,858,518, 6,096,482, and 6,100,582 to Omote et al., all on other relevant photosensitive compositions;

WO 92/00185 to Harris, on a process of producing waveguides from photo-initiated polymerization.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charlie Peng whose telephone number is (571) 272-2177. The examiner can normally be reached on 8:30 am - 5 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Brian Healy
Primary Examiner